# MINORITY AND WOMEN'S HEALTH

NIAID's Office of Special Populations and Research Training (OSPRT) provides oversight and coordination to the Institute's activities in the area of minorities' and women's health, and research training. OSPRT has provided the National Center for Minority Health and Health Disparities with benchmarks on progress made to initiatives contained in the NIAID "Strategic Plan for Addressing Health Disparities: FY 2002–2006" (available at *www.niaid.nih.gov/healthdisparities/NIAID_HD_Plan_Final.pdf*). The plan lists three goals: (1) to conduct research to identify and address health disparities among various populations affected by infectious and immunologic diseases, (2) to increase the number of minority scientists and grantees, and (3) to improve education and outreach activities for the transfer of health information to these populations. NIAID continues to prioritize basic, clinical, and epidemiologic research on the health problems of minorities and women; efforts to increase participation of minority scientists in its research programs; and outreach activities designed to communicate research developments to these populations.

These efforts are translated into a scientific portfolio of research programs on diseases that disproportionately impact minorities' and women's health.

## Minority and Women's Health Programs

NIAID's programmatic research agenda for minorities' and women's health includes immune-mediated diseases, infectious agents, AIDS, vaccine prevention, and therapeutic interventions, in an effort to alleviate the many risk factors in minorities and women health. The Institute conducts basic and clinical research, either through its intramural laboratories or through federally-funded extramural mechanisms, on a broad spectrum of these diseases. Additionally, the Institute collaborates with other organizations to address health disparities in these populations.

**Asthma.** Asthma is a chronic disease affecting more than 20 million Americans. It disproportionately affects minorities, particularly African-American and Hispanic children residing in inner cities. Results from the Inner-City Asthma Study, cosponsored by the National Institute of Environmental Health Studies, indicated that physician education and an extensive environmental intervention successfully reduced allergen levels in the homes of inner-city children with asthma. This reduction resulted in an improvement in asthma morbidity, measured by decreases in asthma symptoms, number of hospitalizations, and number of unscheduled physician visits for asthma. The reduction continued 1 year post-intervention. The physician feedback intervention resulted in a 20 percent decrease in unscheduled emergency room or clinic visits for poorly controlled asthma.[44] These findings could lead to significantly improved health for inner-city children with asthma and reduce the high medical, economic, and social costs associated with this disease.

**Autoimmune diseases.** Autoimmune diseases are those in which the immune system mistakenly attacks the body's own cells, tissues, and organs. Autoimmune diseases affect an estimated 5 to 8 percent of the U.S. population, approximately 14 to 24 million people. Several of these diseases disproportionately affect women and minority populations. For example, in some autoimmune diseases, including thyroiditis, scleroderma, systemic lupus erythematosus (SLE), and Sjögren's syndrome, females represent 85 percent or more of patients. Ninety percent of the nearly 2 million Americans diagnosed with (or suspected of having) SLE are women. SLE damages multiple tissues and organs and can affect muscles, skin, joints, and kidneys, as well as the brain and nerves. In other diseases such as multiple sclerosis, myasthenia gravis, and inflammatory bowel diseases, the disparity

is smaller, with females representing 55 to 70 percent of patients. The reasons for these gender-based variations are not known.

NIAID supports a broad range of basic and clinical research programs in autoimmunity, including the Autoimmunity Centers of Excellence, the Autoimmune Diseases Prevention Centers, and multidisciplinary research on gender-based differences in immune responses. In FY 2005, the Prevention Centers supported 22 pilot projects to test innovative prevention approaches or methods to measure biomarkers of autoimmune disease progression. In FY 2005, NIAID began conducting clinical trials through the Stem Cell Transplantation for Autoimmune Diseases Consortium to assess the efficacy of hematopoietic stem cell transplantation to treat severe multiple sclerosis, SLE, and scleroderma. The consortium also will conduct studies of the underlying immune mechanisms of these diseases. NIAID chairs the trans-NIH Autoimmune Diseases Coordinating Committee (ADCC), which submitted its Research Plan to Congress in December 2002. The ADCC submitted its third report to Congress in March 2005; it summarized FY 2003 NIH accomplishments and activities in autoimmune diseases research. For the ADCC Research Plan, see *www.niaid.nih.gov/publications/pdf/ADCCFinal.pdf*.

Collaborations among NIAID, the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), and the Juvenile Diabetes Research Foundation International established the Immune Tolerance Network (ITN), an international consortium dedicated to the clinical evaluation of novel, tolerogenic approaches for the treatment of autoimmune diseases, asthma and allergic diseases, and the prevention of graft rejection. ITN also conducts integrated studies on the underlying mechanisms of these approaches and develops and evaluates markers and assays to measure the induction, maintenance, and loss of tolerance in humans. ITN includes more than 80 basic and clinical scientists and physicians at more than 40 institutions in the United States, Canada, Europe, and Australia. For more information about the ITN, see *www.immunetolerance.org*.

**Hepatitis C.** Hepatitis C virus (HCV) infection is the most common chronic bloodborne viral infection in the United States. An estimated 3.9 million (1.8 percent) Americans have been infected with HCV, and 2.7 million of them are chronically infected. New infections in the United States continue at the rate of approximately 30,000 cases per year.[45] HCV disproportionately affects minority populations, particularly African-Americans and Hispanics. Moreover, available treatments for HCV tend to be less effective for African-Americans than for other populations.[46]

To investigate this issue, NIAID is supporting a study to determine whether there are specific genetic and molecular factors that cause African-American patients to respond poorly to the standard interferon and ribavirin therapy used for hepatitis C that seems to be effective in White populations. Understanding the reasons for differential drug responses among these populations could lead to the development of new drugs to treat HCV. In particular, NIAID supports the Hepatitis C Cooperative Research Centers (CRC) network, which unites basic and clinical researchers investigating HCV infection and the disease process to identify new and better means of prevention and treatment.

One Hepatitis C CRC is conducting an epidemiological study of the relationships between HCV replication, evolution, and disease progression in Alaska Natives. This well-defined and well-monitored study could provide important information about the natural history of hepatitis C and affect the future treatment of hepatitis C worldwide.

**HIV/AIDS.** HIV/AIDS continues to disproportionately affect minorities. Racial and ethnic minority populations in the United States, primarily African-Americans and Hispanics,

constitute 58 percent of the more than 900,000 cases of AIDS reported to the Centers for Disease Control and Prevention (CDC) since the epidemic began in 1981. African-Americans make up almost 40 percent of all AIDS cases reported in the United States, yet according to the U.S. Census Bureau, they comprise only 13 percent of the U.S. population. Hispanics represent 19 percent of all AIDS cases and are approximately 14 percent of the U.S. population. Of the new AIDS cases reported in 2004, 49 percent were among African-Americans, 20 percent among Hispanics, 28.3 percent among Whites, and 1.7 percent among American Indians/Alaska Natives and Asian Americans/ Pacific Islanders. Among women, African-Americans and Hispanics account for 83 percent of AIDS cases; among men, African-Americans and Hispanics account for 64 percent of cases. Injection drug use is a major factor in the spread of HIV in minority communities. Other factors contributing to the spread of HIV/AIDS in these communities include male-to-male sexual contact and, increasingly, heterosexual transmission.[47]

HIV/AIDS also continues to increase among women. In 2004, the Joint United Nations Programme on HIV/AIDS estimated that 40.3 million people were living with HIV/AIDS worldwide, with women accounting for nearly 50 percent of all cases.[48] In the United States, as of December 2004, women accounted for more than 18 percent (178,463) of the cumulative estimated number of 944,306 AIDS cases reported among adults and adolescents. In recent years, the incidence of AIDS has increased more rapidly among women than men. The proportion of new AIDS cases among women more than tripled from 1985 to 2002, from 7 percent to 26 percent. Almost 56 percent of HIV-infected women in the United States acquired HIV through heterosexual contact with HIV-infected men, and 40.7 percent through injection drug use. Also, HIV infection disproportionately affects minority women. Seventy-nine percent of HIV-infected women are African-American and/or of Hispanic ethnicity, compared with only 58.5 percent of HIV-infected men.[49]

Worldwide, women are at an increased risk of acquiring HIV due to substantial mucosal exposure to seminal fluids, prevalence of nonconsensual sex, and sex without condom use. Compounding these risks for women are the unknown risk behaviors of their male sexual partners. Women also face gender-specific manifestations of HIV disease such as recurrent vaginal yeast infections, pelvic inflammatory disease, genital ulcer disease, severe herpes infections, and gender-specific abnormalities related to infection with human papillomavirus and vulvar and vaginal carcinomas.

Drug metabolism also differs in women and men, potentially resulting in differential responses to antiretroviral therapy and an increased incidence of drug toxicities in women. Frequently, women with HIV infections have difficulty accessing health care, and carry a large burden of caring for children and other family members who might also be HIV-infected. They often lack social support and face other challenges that could interfere with their ability to adhere to treatment regimens. In light of this, NIAID supports clinical research to investigate gender-specific differences in HIV disease progression, complications, and treatment responses. These studies are being conducted by the Adult AIDS Clinical Trials Group (AACTG), the Pediatric AIDS Clinical Trials Group (PACTG), and the Community Programs for Clinical Research on AIDS (CPCRA). For example, several studies have been initiated through the AACTG to examine the pharmacokinetics of contraceptives in the setting of highly active antiretroviral therapy (HAART); use of antiretroviral therapy in pregnancy; gender differences in responses to HAART among treatment-naive patients; toxicities and complications of different treatment regimens for HIV and HIV co-infections, such as human papillomavirus; metabolic complications of HAART; and postpartum changes in

immunologic responses. For more information about the AACTG, visit *www.aactg.org*.

NIAID also supports investigations of the course of HIV/AIDS disease in women and men in the United States through two epidemiological cohorts, the Women's Interagency HIV study (WIHS) and the Multicenter AIDS Cohort Study (MACS). The WIHS is a cohort of both HIV-infected and uninfected women, while the MACS is a prospective, longitudinal study of HIV disease in homosexual and bisexual men. Studies of these cohorts have repeatedly made major contributions to understanding how HIV is spread, how the disease progresses, and how it can best be treated. In 2003, the WIHS and MACS expanded their study groups by 60 percent to increase the number of minority participants. Studies of the expanded cohorts focus on contemporary questions regarding HIV infection and treatment. For more information about WIHS and MACS, visit *http://statepiaps.jhsph.edu/wihs* and *http://statepi.jhsph.edu/macs/macs.html*.

WIHS researchers have published more than 250 peer-reviewed articles covering a wide scope of scientific research including the natural history of HIV infection; the impact of opportunistic infections and co-infections; the value of HIV viral load and CD4+ cell counts as markers of the success of HAART; clinical outcomes of HAART therapy; the identification of biological, psychosocial and behavioral risk factors; the impact of aging and hormonal factors; the study of HIV-associated malignancies, particularly cervical cancer caused by the human papillomavirus; the analysis of gender differences in HIV disease; and the development of novel methods for analyses of cohort data. In addition, the WIHS has provided an invaluable repository of clinical specimens and accompanying demographic and epidemiologic data to be used for retrospective hypothesis testing. Currently, the WIHS is evaluating the cardiovascular manifestations of HIV among women.

NIAID is also cosponsoring a new program, the Pediatric HIV/AIDS Cohort Study (PHACS), with the National Institute of Child Health and Human Development, the National Institute on Drug Abuse, and the National Institute of Mental Health. The objective of PHACS is to address continuing critical research questions on the clinical course of perinatally acquired HIV infection in adolescents and the consequences of fetal and neonatal exposure to antiretroviral chemotherapy in a representative cohort of children from the United States. The PHACS Leadership Group was funded this year for specific protocols to begin in FY 2006.

Mother-to-child transmission (MTCT) of HIV can occur during pregnancy, childbirth, or through breastfeeding and accounts for more than 90 percent of all cases of childhood HIV infection, especially in countries where effective antiretroviral drugs are not available. As more women of childbearing age become infected, the number of children infected with HIV also is expected to rise.[50] Efforts to prevent MTCT by targeting both the infant and the mother are being examined by the HIV Prevention Trials Network (HPTN) and the PACTG. Data from a NIAID-funded study that began in November 1997 in Uganda showed that the initial benefit to infants, who, along with their mothers, received one dose of nevirapine, was sustained by the group of children until they reached age 18 months. These findings indicate that short-course nevirapine effectively and safely reduces MTCT of HIV and, because of its low cost and ease of administration, provides an important alternative in resource-poor developing countries.

The HPTN also conducts clinical trials of non-vaccine HIV prevention strategies, including topical microbicides. A topical microbicide is a preparation (e.g., gel, cream, or foam) that is applied to the vagina or rectum to inactivate or inhibit pathogens, including HIV, which can be transmitted during sexual intercourse. For more on

microbicides, see page 126. For more information about the HPTN, visit *www.hptn.org*.

NIAID's HIV Vaccine Trials Network (HVTN) is an international network dedicated to developing and testing candidate HIV vaccines in all phases of clinical trials. Both HVTN and HPTN have initiated community outreach programs to educate people about HIV vaccine and prevention research and to encourage participation in clinical trials. Through these outreach activities, HVTN and HPTN researchers aim to enroll a diverse population in their clinical trials, including women and minorities. For more information about the HVTN, visit *www.hvtn.org*.

One of the greatest challenges facing HIV/AIDS researchers today is the recruitment and retention of minorities and women for clinical trials. As the epidemic continues to expand in minority communities, inclusion of these individuals in clinical trials is particularly urgent to ensure that the results of research are applicable to all populations affected by the disease. In October 2003, NIAID hosted a conference, "Increasing Diversity in Clinical Trials: Best Practices", to explore the most effective strategies for recruiting minorities and women. For more information about the conference, see: *www.niaid.nih.gov/healthdisparities/hdsymposium/proceedings2*. In 2003, to address this issue directly, NIAID released a program announcement, "Enrolling Women and Minorities in HIV/AIDS Research Trials," to fund innovative approaches to reach, enroll, and retain women and racial/ethnic minorities in HIV/AIDS research trials in the United States. The initiative supports projects to increase the number of women and minorities who participate in clinical trials for HIV/AIDS relative to the incidence data, and is designed to advance the body of scientific knowledge to improve the diagnosis, treatment, and development of preventive strategies in women and minorities. Additionally, each of NIAID's large, multicenter therapeutic clinical trials networks, i.e., AACTG, PACTG, and CPCRA, strives to ensure enrollment of a sufficient proportion of minority subjects.

NIAID, through its Division of AIDS, is actively involved in educating the public about HIV vaccine research. Targeting at-risk populations, in particular African-Americans, Hispanics, and men who have sex with men, NIAID is implementing a national education campaign to increase awareness of and support for HIV vaccine research. Specifically, the campaign is designed to (a) increase awareness about the urgent need for an HIV vaccine within communities most affected by HIV/AIDS; (b) create a supportive environment for current and future HIV vaccine trial volunteers; and (c) improve the public's perceptions and attitudes towards HIV vaccine research.

An additional challenge is the recruitment of underrepresented minority investigators to AIDS and AIDS-related clinical and basic research disciplines. To address this challenge, NIAID supports a comprehensive portfolio of biomedical and behavioral research aimed at preventing and treating HIV disease in minority communities, training minority investigators, and fostering infrastructure development. NIAID continues to co-fund, with the National Center for Research Resources, the Research Centers in Minority Institutions (RCMIs) program by providing support for HIV/AIDS research pilot projects as well as infrastructure development at RCMIs. In FY 2005, NIAID awarded $2.4 million to support projects at four institutions for research in diverse areas such as vaccine development, drug development, opportunistic infections, immunology, and a Comprehensive Center for Health Disparities.

In addition, in FY 2005, NIAID awarded grant supplements under the Research Supplement to Promote Diversity in Health-Related Research Program, formerly known as the Research Supplements for Underrepresented

Minorities (RSUM) program. The purpose of this program is to attract underrepresented minority investigators into biomedical and behavioral research. The supplements are made to NIAID-funded grantees to recruit and support investigators interested in a particular area of scientific research. The awards are made on behalf of postdoctoral candidates, graduate students, faculty members, undergraduates, and reentry and disabled investigators. Several of the NIAID-sponsored Centers for AIDS Research also have a significant commitment to educating and training minority investigators and providing outreach to minority communities.

**Sexually Transmitted Infections.** Sexually transmitted infections (STIs) are critical global and national health priorities because of their devastating impact on minorities, women, and infants and their inter-relationship with HIV/AIDS. STIs are widespread, with 19 million new cases estimated to occur each year in the United States.[51] Several STIs, including genital herpes, gonorrhea, chlamydia, and syphilis, have higher incidences among minorities than among Whites in the United States.[52]

Symptoms of STIs in women can be minor or nonspecific, especially in the early stages, and are often not diagnosed until late in the disease. STIs that occur during pregnancy can affect the fetus or newborn. About one-quarter to one-half of women infected with an STI during pregnancy give birth to either premature or low birthweight infants. In about one-third to two-thirds of these pregnancies, the infection is passed to the infant and can cause permanent disabilities. Chlamydia, gonorrhea, and other infections of a woman's upper reproductive tract also can complicate pregnancy.

**Chlamydia** is the most commonly reported sexually transmitted bacterial disease in the United States. In 2004, more than 900,000 chlamydia infections were reported to the CDC. In women, chlamydia infections can cause pelvic inflammatory disease, which is a major cause of infertility, ectopic pregnancy, and chronic pelvic pain. The rate of reported infection with *Chlamydia trachomatis* is over three times greater in women than men, and is particularly high in adolescent women. In 2004, the rate of chlamydia among African-American females in the United States was more than seven and a half times higher than the rate among white females (1,722.3 and 226.6 per 100,000, respectively). The chlamydia rate in African-American males was 11 times higher than that in White males (645.2 and 57.3 per 100,000 respectively).[53] NIAID-supported researchers conducted a randomized clinical trial that examined whether expedited treatment could reduce rates of recurrent or persistent gonorrhea and chlamydial infections among women and heterosexual men. Results of this study showed that expedited treatment of sex partners increased the proportion of partners who received the treatment and decreased persistent and recurrent gonorrhea and chlamydial infection among the study participants.

**Gonorrhea** is the second most commonly reported notifiable disease in the United States. Infections due to *Neisseria gonorrhoeae* are a major cause of pelvic inflammatory disease. Between 2000 and 2004, overall gonorrhea rates declined by 15.2 percent. African-American women between the ages of 15 to 19 had the highest rates among all groups.[54]

**Genital herpes** affects at least 45 million people in the United States. About one in five adolescents and adults in the United States has genital herpes, but most are unaware they have the virus. Although most genital herpes cases present no symptoms, asymptomatic individuals can transmit herpes simplex virus (HSV type 1 or 2) to others, and a pregnant woman infected with HSV can transmit the virus to her baby.[55] NIAID is investigating treatments for herpes, including antiviral drugs and monoclonal antibodies, as well as studies to assess the role of antiviral suppressive therapy and vaccination in decreasing herpes

transmission. In FY 2003, NIAID launched a pivotal phase III double-blind clinical efficacy trial of Herpevac, an investigational vaccine for the prevention of genital herpes in women ages 18 to 30. This trial, called the Herpevac Trial for Women, is being conducted at more than 35 clinical sites across the United States as a public-private partnership between NIAID and GlaxoSmithKline. For more information about the Herpevac Trial for Women, see: *www.niaid.nih.gov/dmid/stds/herpevac/default.htm*.

**Group B Streptococcus (GBS)** is another infectious bacterium that can cause disease in women. This bacterium can produce harmful infections in women during pregnancy and can cause infections in newborns as a result of being passed from mother to child during labor and delivery. When these infections occur in newborns, they can be life-threatening. Although women often receive antibiotics during labor to prevent GBS infection in their babies, GBS infections remain a leading cause of neonatal disease.

NIAID is currently supporting a GBS vaccine research study called the Streptococcal Prevention in Non-Pregnant Women Study to determine whether a single vaccination with an investigational GBS type III vaccine can prevent non-pregnant women from acquiring GBS type III bacteria in their reproductive tract. There are several types of GBS; type III is being studied because it is common in newborn infections.

**Syphilis** is caused by *Treponema pallidum*, a bacterium that is most commonly transmitted through sexual activity. It is possible for pregnant women with the disease to pass the bacterium to their unborn children, in whom it can cause serious mental and physical disorders. Although the number of cases of syphilis is declining in the United States, in 2004, young women 20 to 24 years of age and men 35 to 39 years of age had the highest incidence of syphilis.[56] In 2004, the rate of primary and secondary syphilis among African-Americans was 5.6 times higher than the rate among Whites.[57] The NIAID-supported Sexually Transmitted Disease (STD) Clinical Trials Unit is currently conducting a randomized phase III trial to evaluate the equivalency of oral azithromycin versus injectable benzathine penicillin for treatment of primary syphilis. If successful, this could provide an additional antimicrobial strategy for treatment of this difficult disease.

**Trichomoniasis** is a common sexually transmitted infection in the United States that affects both men and women, although symptoms are more common in women. Trichomoniasis is caused by a single-celled protozoan parasite called *Trichomonas vaginalis*. There are an estimated of 7.4 million new cases a year in both men and women in the United States. Epidemiologic studies suggest trichomoniasis is 1.5 to 4.0 times more common among African-Americans than other racial/ethnic groups.[58] The NIAID-supported STD Clinical Trials Unit recently completed a multisite clinical study to determine the concordance of trichomoniasis between male and female partners.

NIAID has created an extensive infrastructure for conducting basic and applied research on STIs, including the STI Cooperative Research Centers, the STI Clinical Trials Unit, and the Topical Microbicides Program. These activities are part of an overall Institute effort to initiate and support a variety of research projects that focus on (1) developing vaccines, topical microbicides, and treatments for the microbes that cause STIs; (2) developing better and more rapid diagnostics; (3) sequencing the genomes of sexually transmitted pathogens; and (4) understanding the long-term health impact of sexually transmitted pathogens in various populations. For more information about NIAID research on sexually transmitted diseases, see: *www.niaid.nih.gov/dmid/stds*.

In addition, NIAID supports several clinical and epidemiological studies that are focused on

STIs in minority populations. The goals of these studies include identifying risk factors for STIs in minority populations, examining the relationship of STIs with infertility and pregnancy outcomes, and evaluating the effectiveness of prevention and control strategies in minority communities.

NIAID also supports training of minority scientists in the area of STI research. Through a collaborative training program with the Sexually Transmitted Disease CRCs, NIAID supports a research program with second-year medical students from Howard University in Washington, DC. This program provides students with a 10-week STI research experience at the STI CRCs, with the long-term objective of encouraging young minority physicians to pursue careers in STI research.

**Transplantation.** Transplantation treatment and effectiveness represent a key health disparity for African-Americans, who are at increased risk for end-stage organ failure and the need for a transplant. Despite a disproportionate representation on organ transplant waiting lists (27.2 percent of the total and 35 percent of kidney waiting list candidates), African-Americans comprised only 18 percent of transplant recipients in 2004. In contrast to these disparities, African-Americans, who make up approximately 12 percent of the U.S. population, accounted for 14.1 percent of deceased organ donors in 2004. (For more information about data on transplantation, see the U.S. Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients Annual report available at: *http://www.optn.org/AR2005/default.htm*.

For reasons that are not well understood, African-Americans experience lower survival rates after transplantation and higher incidences of acute graft rejection and long-term immunosuppression-related adverse effects than do Whites. These disparities could be related to genetic factors, immunological factors, differences in drug pharmacokinetics, access to health care, socioeconomic factors, and medical noncompliance. To clarify the genetic factors that result in variable graft survival among populations, NIAID and the NIDDK launched the Genomics of Transplantation Cooperative Research Program in FY 2004. Researchers in this program are examining genetic polymorphisms and gene expression patterns to understand and predict transplant outcomes in diverse populations. The program will be expanded in FY 2006 with the long-term goal of understanding the genetic basis of immune-mediated graft rejection and differences in transplant outcomes. This information will provide a rational basis for the development of more effective treatment and prevention strategies to improve long-term graft survival and quality of life for transplant recipients.

For kidney transplantation, matching of histocompatibility antigens (proteins that are the major targets of immune-mediated graft rejection) between donors and recipients is a consideration in prioritizing the distribution of organs. Because of racial or ethnic differences in the frequency of alleles (variants of a gene) at human leukocyte antigen (HLA) loci, African-Americans are less likely to find a good match in the donor kidney pool than are candidates from other racial or ethnic groups, and the rate of graft failure is proportional to the level of mismatching.[59] These findings also apply to bone marrow transplantation, where HLA mismatching increases the risk of graft failure and graft versus host disease.[60] To increase knowledge of HLA diversity and improve donor-recipient matching, NIAID supports research to identify new HLA alleles in distinct racial and ethnic groups. NIAID-supported researchers have discovered 13 new HLA alleles in African-Americans, 3 new alleles in Native Alaskan Yup'ik, and 2 new alleles in Lakota Sioux. In addition to facilitating improved donor-recipient matching in organ and hematopoietic stem cell transplantation, this research could provide

additional insights into the origin and diversity of humans. For more information about policies related to matching organ donors and recipients, see: *www.optn.org/policiesAndBylaws/policies.asp*.

In FY 2005, NIAID, with cosponsorship from the National Institute of Neurological Diseases and Stroke, awarded five research cooperative agreements under the new HLA Region Genetics in Immune-Mediated Diseases program. The objectives of this program are to define the association between HLA region genes or genetic markers and immune-mediated diseases, including risk and severity of disease and organ and cell transplantation outcomes.

**Tuberculosis.** Tuberculosis (TB), which is caused by the bacterium *Mycobacterium tuberculosis (M. tb)*, is one of the leading causes of illness and death in the world and kills more people than AIDS and malaria combined. The World Health Organization estimates that approximately one-third of the world's population is infected with *M.tb.* Approximately 8 million new TB cases occur annually, and 2 million people die each year from TB.[61]

TB also remains a public health concern in the United States. The CDC estimated that, in 2005, 5 to 10 percent of the U.S. population (14 to 28 million persons) was infected with TB, and more than 14,000 new TB cases occurred in the 50 States and the District of Columbia. The disease persists disproportionately among racial/ethnic minority populations in the United States. During 2005, the TB rate among foreign-born persons was 8.7 percent times that of U.S.-born persons. The TB rates among Hispanics and African-Americans were 7.3 and 8.3 times higher than among Whites, respectively.[62] Combined factors such as urban poverty, high HIV infection rates, and the effects of household crowding might contribute to the disproportionate impact of TB on minorities. Also, the rise of multidrug-resistant strains of TB and co-infection with HIV has further extended the impact of TB in the United States and around the world.

NIAID is helping to fight TB in all populations, domestically and globally, by developing promising strategies for disease control and prevention. The NIAID TB research agenda supports studies aimed at better understanding the pathogenesis and human immune response to TB and developing improved diagnostics, more effective vaccines, and novel medicines. More than 100 candidate vaccines have been screened for protective efficacy, new drugs are being examined that might lead to shorter antibiotic treatment, and innovative programs have been developed that promote international collaboration among investigators.

One such program is the Tuberculosis Research Unit (TBRU), established through a contract with Case Western Reserve University in 1994. A cornerstone in NIAID's global fight against TB, the TBRU contract has been extended through 2007, with the goal of creating a multidisciplinary, international team dedicated to:

- Identifying and improving the understanding of the molecular biology and physiology of *M.tb*;
- Defining the host immune response to mycobacterial infection;
- Developing new epidemiologic tools; and
- Evaluating new or improved drugs, diagnostics, and vaccines preclinically and in phase I–III clinical trials.

Although most of NIAID's TB research is focused on aspects of disease and interventions that are applicable to all TB-affected populations around the world, NIAID is supporting some TB epidemiological studies that are specifically focused on issues relevant to North American Hispanic populations affected by TB. These studies are examining such variables as which

strains of TB are circulating in these populations, risk factors for disease, routes of TB transmission, effectiveness of interventions and treatments, and innovative programs to promote international collaboration among investigators.

## Minority Researchers' Training Programs

Increasing the participation of underrepresented minority investigators in biomedical research is a priority for NIAID and NIH. In addition to supporting NIH-wide programs, NIAID has developed and supported a variety of innovative programs for biomedical research that include minority students from high school through postdoctoral training.

In FY 2005, NIAID extended its longstanding Introduction to Biomedical Research Program. The Richard M. Asofsky Scholars In Research (ASIR) award was created to represent and honor Dr. Asofsky's dedication to bringing underrepresented minorities into the biomedical sciences. The ASIR program provides supplemental funding to NIAID extramural principal investigators for the purpose of supporting underrepresented minority high school and college students in their research laboratories and exposing them to research career opportunities in the areas of allergy, immunology, transplantation, microbiology, and infectious diseases, including AIDS. These NIAID ASIR awards are used to encourage the development of underrepresented minority researchers as outlined in the NIAID *Strategic Plan on Health Disparities*. For more information about the Richard M. Asofsky Scholars In Research award, see: *www.niaid.nih.gov/ibrp/ASOFKSY_Research.htm*.

Since 1993, NIAID has conducted a symposium designed for recipients of the Research Supplements to Promote Diversity in Health-Related Research, formerly known as Research Supplements for Underrepresented Minorities, to encourage them to continue studies related to NIAID's biomedical research agenda. In November 2005, NIAID held its seventh Bridging the Career Gap for Underrepresented Minority Scientists symposium. For more information about the symposium, see: *www.niaid.nih.gov/osprt/bridging_the_career_gap.htm*.

In an effort to engage scientific discovery and inclusion of minority students in K-12 programs, NIAID held a pilot forum in April 2005 with Washington, D.C., metropolitan area high school science teachers and students entitled Increasing Minority Student Interest in Science, Engineering, and Math: Challenges and Solutions. This was an important outreach effort in NIAID's ongoing commitment to promote an interest in science and research careers among high school students and to increase the numbers of underrepresented minorities involved in scientific research. The students and teachers participated in concurrent workshops that addressed ways to keep minority students interested in science and math and listened to various NIH institute representatives explain their scientific research missions and research training opportunities.

## Training Opportunities in NIAID Laboratories

In February 2005, NIAID's Division of Intramural Research (DIR) Office of Training and Special Emphasis Programs (OTSEP) held its third annual outreach program for underrepresented minorities in the biomedical sciences. This 5-day program on Intramural NIAID Research Opportunities (INRO) included scientific lectures by NIAID researchers, discussions with scientists, and tours of the Research Technologies Branch and the Vaccine Research Center (VRC). Three key features distinguish this new program and will result in more minority students participating in intramural training programs at all levels. Eventually, this programmatic strategy will create a larger pool of potential candidates for

career positions in NIAID. First, the selection of students is based on academic excellence, interest in NIAID research, and desire to participate in NIAID's DIR training programs. Second, current DIR minority trainees are included in all aspects of the program and are invited to give presentations. This allows the visiting students to see first-hand what can be accomplished and to network with the trainees. Third, all participants will be tracked in future years to inform them about NIAID training and professional opportunities and to enlist their participation in OTSEP's outreach activities.

In FY 2005, the OTSEP Underrepresented Minority Programs were fully subscribed for the postbaccalaureate Intramural Research Training Awards (IRTA) traineeships. (See table on page 125 for more information about the career paths of IRTA-sponsored trainees.)

A nationwide marketing strategy proved highly successful in promoting INRO 2005. Historically Black colleges and universities were targeted for outreach. As a result of these activities, the number of qualified applicants nearly doubled to 121. Twenty-six applicants were selected to attend INRO 2005. Twelve INRO 2005 participants were offered training positions in DIR labs; 11 of these students have begun their laboratory traineeships in the following programs: Postdoctoral IRTA, Postbaccalaureate IRTA, Technical IRTA, Summer Research Fellowship Program, and Summer Internship Program.

DIR's Summer Internship Program in the Biomedical Sciences increased this year to 103 students. Using the reduction in the percentage of White students as an overall measure of diversity, there was a greater diversity this year (50 percent) compared with 2004 (60 percent) and 2003 (67 percent).

## Research Guidelines

In all clinical research, including biomedical and behavioral studies, NIAID complies with the 1993 NIH *Guidelines on the Inclusion of Women and Minorities as Subjects in Clinical Research*. Congress mandated the establishment of these guidelines in the NIH Revitalization Act of 1993. The guidelines stipulate that women and members of minority groups must be included in all NIH-supported research projects involving human subjects, unless there is a compelling reason that such inclusion would be inappropriate. The guidelines also state that women of childbearing potential should not be routinely excluded from participation in clinical research.

OSPRT staff played a major role in updating the NIH report, *Monitoring Adherence to the NIH Policy on the Inclusion of Women and Minorities as Subjects in Clinical Research*, as required by the Government Accountability Office. OSPRT staff also assisted in the development of the *Outreach Notebook* for extramural principal investigators who conduct or plan to conduct clinical trials with human subjects. For the NIH report, *Monitoring Adherence to the NIH Policy on the Inclusion of Women and Minorities as Subjects in Clinical Research*, see *orwh.od.nih.gov/pubs/Updated 2002-2003.pdf;* for the *Outreach Notebook*, see: *orwh.od.nih.gov/inclusion/outreach.pdf*.

| Examples of Career Paths of Former IRTA Trainees as of September 2005 | |
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| **GRADUATE STUDIES** | |
| **Degree Program** | **Institution** |
| PPP | Barry University |
| M.P.H. | George Washington University |
| | Johns Hopkins University |
| Ph.D. | California Institute of Technology |
| | Duke University |
| | Georgetown University |
| | Washington University |
| M.D. | Emory School of Medicine |
| | George Washington University School of Medicine |
| | Howard University School of Medicine |
| | Johns Hopkins University School of Medicine |
| | Morehouse School of Medicine |
| | University of California Davis School of Medicine |
| | University of Maryland School of Medicine |
| | University of Pittsburgh School of Medicine |
| | University of Rochester School of Medicine |
| | University of Virginia School of Medicine |
| | University of Washington School of Medicine |
| | Wake Forest School of Medicine |
| | Wayne State School of Medicine |
| | Wayne State School of Medicine |
| M.D./Ph.D. | Albert Einstein School of Medicine |
| | Cornell/Rockefeller/SloanKettering |
| | Harvard University |
| | Mount Sinai School of Medicine |
| | University of Texas at Austin |
| | Vanderbilt University |
| **PROFESSIONAL POSITION** | |
| Assistant Professor | Virginia Commonwealth University |
| | Yale University |
| Biologist | NIAID, NIH |
| NIAID Principal Investigator | NIAID, NIH |
| Program Officer | NIAID, NIH |
| Public Policy | AIDS ACTION |
| Science Writer | FASEB |
| Technician | NIAID, NIH |

Key: PPP Postbaccalaureate Premedical Program